

WHAT IS CLAIMED IS:

1. An object-oriented virtual machine interface for a reconfigurable wireless
5 network communication apparatus;
said reconfigurable wireless network communication apparatus comprising a
plurality of kernels; and
said object-oriented virtual machine interface comprising a plurality of
software objects including a first subset of said software objects, each software object
10 in said first subset of said software objects associated with a different kernel in said
plurality of kernels so that a change to a software object in said first subset of said
software objects results in a change in said kernel associated with said software object.
2. The object-oriented virtual machine interface of claim 1 wherein said plurality
15 of software objects includes a second subset of said software objects, each software
object in said second subset of said software objects having at least one adjustable
attribute.
3. The object-oriented virtual machine interface of claim 2 wherein said as least
20 one adjustable attribute is a static or dynamic attribute.
4. The object-oriented virtual machine interface of claim 1 wherein a kernel in
said plurality of kernels is configurable in accordance with a communication protocol.
- 25 5. The object-oriented virtual machine interface of claim 4 wherein said selected
communication protocol is a CDMA (code division multiple access) protocol.
6. The object-oriented virtual machine interface of claim 4 wherein said
communication protocol is selected from the group consisting of IS-95 CDMA,
30 IS-95B CDMA, CDMA TIA IS2000, TIA IS 2000A, wideband CDMA (WCDMA),
cdma2000, and ARIB WCDMA.

09828391-040504
T05040 "T8E82850

7. The object-oriented virtual machine interface of claim 4 wherein said selected communication protocol is a time division multiple access (TDMA) protocol.

35

8. The object-oriented virtual machine interface of claim 7 wherein said communication protocol is IS-136 TDMA.

9. The object-oriented virtual machine interface of claim 1 wherein a software object in said plurality of software objects is a searcher object, a code generation unit object or a finger object.

40

10. The object-oriented virtual machine interface of claim 1 wherein a software object in said plurality of software objects is a matched filter object or a combiner object.

45

11. The object-oriented virtual machine interface of claim 1 wherein a software object in said plurality of software objects is an uplink object or a downlink object.

12. The object-oriented virtual machine interface of claim 1,
said plurality of software objects comprising a searcher object, a code generation unit object, a finger object, a matched filter object, a combiner object, an uplink object and a downlink object; and

50

said plurality of kernels comprising a searcher kernel, a code generation unit kernel, a finger kernel, a matched filter kernel, a combiner kernel, an uplink kernel and a downlink kernel; wherein:

55

said searcher object is associated with said searcher kernel;
said code generation unit object is associated with said code generation unit kernel;

said finger object is associated with said finger kernel;
said matched filter object is associated with said matched filter kernel;
said combiner object is associated with said combiner kernel;
said uplink object is associated with said uplink kernel; and
and said downlink object is associated with said downlink kernel.

60

- 65 13. An object-oriented reconfigurable system comprising an object-oriented virtual machine interface, a virtual machine and a reconfigurable apparatus,
said reconfigurable apparatus coupled to said virtual machine and comprising a plurality of kernels; and
said object-oriented virtual machine interface coupled to said virtual machine
70 and comprising a plurality of software objects including a first subset of said software objects, each software object in said first subset of said software objects associated with a different kernel in said plurality of kernels such that a change to a software object in said first subset of said software objects results in a change in said kernel associated with said software object.
- 75 14. The object-oriented reconfigurable system of claim 13 wherein said plurality of software objects includes a second subset of said software objects, each software object in said second subset of said software objects having at least one adjustable attribute.
- 80 15. The object-oriented reconfigurable system of claim 14 wherein said at least one adjustable attribute is a static or dynamic attribute.
- 85 16. The object-oriented reconfigurable system of claim 13 further comprising:
an application program interface comprising a plurality of software routines, each software routine in said plurality of software routines representing a different communication protocol, wherein said plurality of software routines comprise software calls to said plurality of software objects; and
an application program comprising software calls to said plurality of software
90 routines.
17. The object-oriented reconfigurable system of claim 16 further comprising:
a compiler within said virtual machine to translate said application program into machine-readable instructions executable on said object-oriented reconfigurable
95 system.

18. The object-oriented reconfigurable system of claim 17 further comprising:
a resource allocator within said object-oriented reconfigurable system, said
5 resource allocator configured to receive said machine-readable instructions and issue a
signal to configure a kernel in said plurality of kernels.
19. The object-oriented reconfigurable system of claim 13 further comprising:
an application program for utilizing said plurality of software objects.
- 10 20. The object-oriented reconfigurable system of claim 19 further comprising:
a compiler within said virtual machine to translate said application program
into machine-readable instructions executable on said object-oriented reconfigurable
system.
- 15 21. The object-oriented reconfigurable system of claim 20 further comprising:
a resource allocator configured to receive said machine-readable instructions,
and issue a command signal to control a kernel in said plurality of kernels.
- 20 22. The object-oriented reconfigurable system of claim 13 wherein a software
object in said plurality of software objects is a searcher object, a code generation unit
object a finger object, an uplink object or a downlink object.
- 25 23. The object-oriented reconfigurable system of claim 13,
said plurality of software objects in said first subset of said software objects
comprising a searcher object, a code generation unit object, a finger object, a matched
filter object, a combiner object, an uplink object and a downlink object; and
said plurality of kernels comprising a searcher kernel, a code generation unit
kernel, a finger kernel, a matched filter kernel, a combiner kernel, an uplink kernel and
30 a downlink kernel; wherein:
said searcher object is associated with said searcher kernel;
said code generation unit object is associated with said code generation unit
kernel;
said finger object is associated with said finger kernel;

said matched filter object is associated with said matched filter kernel;
said combiner object is associated with said combiner kernel;
5 said uplink object is associated with said uplink kernel; and
and said downlink object is associated with said downlink kernel.

24. The object-oriented reconfigurable system of claim 13 wherein said plurality
of kernels comprise a searcher kernel, a code generation unit kernel, a finger kernel, an
10 uplink kernel and a downlink kernel.

25. The object-oriented reconfigurable system of claim 13 wherein a kernel in said
plurality of kernels is configured to operate under a CDMA protocol.

15 26. The object-oriented reconfigurable system of claim 25 wherein said CDMA
protocol is selected from the group consisting of IS-95 CDMA, IS-95B CDMA,
CDMA TIA IS2000, TIA IS 2000A, wideband CDMA (WCDMA), cdma2000, and
ARIB WCDMA.

20 27. The object-oriented reconfigurable system of claim 13 wherein a kernel in said
plurality of kernels is configured to operate under a TDMA protocol.

28. The object-oriented reconfigurable system of claim 27 wherein said TDMA
protocol is IS-136 TDMA.

25

29. A method of communication using an object oriented virtual machine interface
and a reconfigurable multi-protocol communication apparatus, said reconfigurable
multi-protocol communication apparatus including a plurality of kernels and an
interconnect structure for interconnecting said plurality of kernels, said method
30 comprising:

creating a plurality of software objects, each software object in said plurality of
software objects corresponding to a different kernel in said plurality of kernels;

assigning an attribute value to a software object in said plurality of software
objects in accordance with a communication protocol; and

configuring the kernel associated with said software object in accordance with said attribute value.

5

30. The method of claim 29 wherein at least two software objects in said plurality of software objects have a hierarchical relationship.

31. The method of claim 29 further comprising developing an application program
10 that includes software calls to said plurality of software objects.

32. The method of claim 31 further comprising developing a software virtual machine to process said application program.

15 33. The method of claim 32 further comprising translating said application program into a program executable on said software virtual machine.

34. The method of claim 33 further comprising issuing, from said software virtual machine, an instruction for controlling a kernel in said plurality of kernels.

20

35. The method of claim 29 further comprising:
forming an application program interface comprising a plurality of software routines, said plurality of software routines representing a plurality of communication protocols, wherein said plurality of software routines comprise software calls to said
25 plurality of software objects.

36. The method of claim 29 further comprising developing an application program comprising software calls to said plurality of software routines.

30 37. A computer program product for a reconfigurable object-oriented apparatus comprising a plurality of kernels and an interconnect structure for interconnecting said plurality of kernels, the computer program product comprising a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising:

instructions for instantiating a plurality of software objects, each software object in said plurality of software objects corresponding to a different kernel in said plurality of kernels such that a change to said software object results in a change in a state of said corresponding different kernel;

instructions for assigning an attribute value to a first software object in said plurality of objects according to a communication protocol; and

issuing machine-readable instructions to configure the kernel associated with said first software object in accordance with said attribute value.

38. The computer program product of claim 37, wherein the computer program mechanism further comprising instructions for:

instantiating a plurality of software routines from an application program interface, said plurality of software routines representing a plurality of standards, wherein said plurality of software routines comprise software calls to said plurality of software objects.

39. The computer program product of claim 37 wherein said plurality of software objects comprise:

a searcher object;
a code generation unit object;
a finger object;
an uplink object; and
a downlink object.

40. The computer program product of claim 39 wherein said plurality of kernels comprise:

a searcher kernel, a code generation unit kernel, a finger kernel, an uplink kernel and a downlink kernel respectively corresponding to said searcher object, said code generation unit object, said finger object, said uplink object and said downlink object, respectively.

41. A computer program product of claim 39 wherein said communication protocol is CDMA.

5

42. An apparatus to facilitate wireless communication, comprising a hardware reconfigurable and software programmable processor responsive to a predetermined virtual machine interface.

10 43. A method for reconfiguring a wireless network communication apparatus; said reconfigurable wireless network communication apparatus comprising a plurality of kernels;

the method comprising:

parsing an application program that designates a communication protocol; and

15 producing machine readable data capable of reconfiguring said reconfigurable wireless network communication apparatus in accordance with said communication protocol.

20 44. The method of claim 43 wherein an object-oriented virtual machine interface comprises a plurality of software objects, each software object in said plurality of software objects associated with a different kernel in said plurality of kernels so that a change to a software object in said plurality of software objects results in a change in said kernel associated with said software object;

25 said machine readable data including a first software object selected from said plurality of software objects.

45. The method of claim 44 wherein said first software object is a function or procedure.

30 46. A computer program product for use in conjunction with a reconfigurable wireless network communication apparatus, said reconfigurable apparatus comprising a plurality of kernels, the computer program product comprising a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising:

a program module for reconfiguring said reconfigurable wireless network communication apparatus comprising:

5 instructions for parsing an application program that designates a
communication protocol; and

instructions for producing machine readable data capable of reconfiguring said reconfigurable network communication apparatus in accordance with said communication protocol.

10

47. The computer program product of claim 46, further including:

an object-oriented virtual machine module comprising a plurality of software objects, each software object in said plurality of software objects associated with a different kernel in said plurality of kernels so that a change to a software object in said plurality of software objects results in a change in said kernel associated with said software object; wherein

said machine readable data include a first software object selected from said plurality of software objects.

20 48. The computer program product of claim 47 wherein said first software object
is a function or procedure.

49. The method of claim 1 wherein a software object in said plurality of software objects is associated with at least two kernels in said plurality of kernels.

25

50. The method of claim 1 wherein at least two kernels in said plurality of kernels is associated with the same software object in said plurality of software objects.

51. The object-oriented reconfigurable system of claim 13 wherein a software
30 object in said plurality of software objects is associated with at least two kernels in
said plurality of kernels.

52. The object-oriented reconfigurable system of claim 13 wherein at least two kernels in said plurality of kernels is associated with the same software object in said
- 5 plurality of software objects.

09823331-040504
T05040" TEE92860